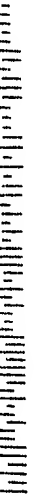


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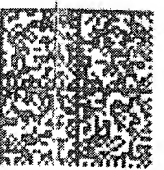
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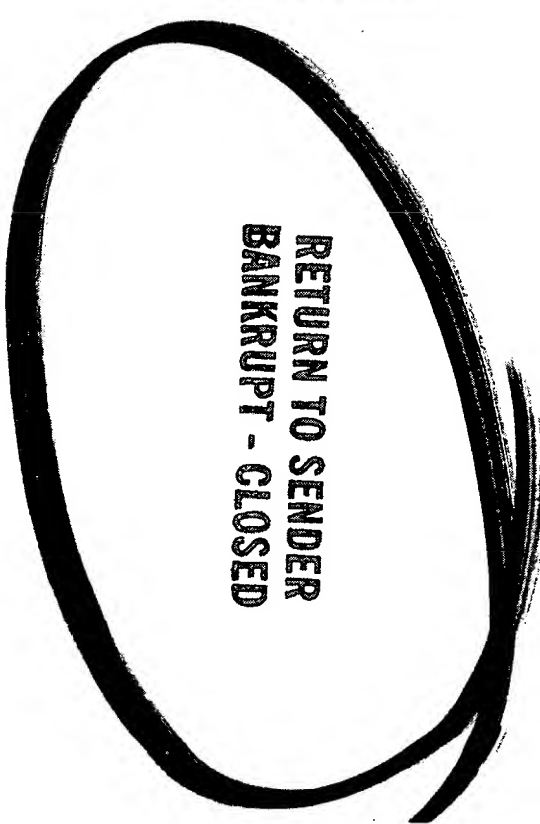
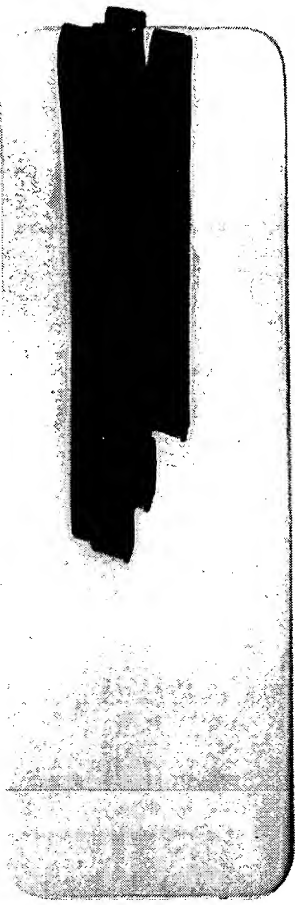
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NOTICE OF ALLOWANCE AND FEE(S) DUE

24251 7590 06/16/2004  
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EXAMINER	
CLARK, JASMINE JHIHAN B	
ART UNIT	PAPER NUMBER
2815	
DATE MAILED: 06/16/2004	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,852	03/23/2001	Seong Min Seo	AB-1128 US	6922

TITLE OF INVENTION: SEMICONDUCTOR PACKAGE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	09/16/2004

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS** FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE REFLECTS A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE APPLIED IN THIS APPLICATION. THE PTOL-85B (OR AN EQUIVALENT) MUST BE RETURNED WITHIN THIS PERIOD EVEN IF NO FEE IS DUE OR THE APPLICATION WILL BE REGARDED AS ABANDONED.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status is changed, pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above and notify the United States Patent and Trademark Office of the change in status, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check the box below and enclose the PUBLICATION FEE and 1/2 the ISSUE FEE shown above.

☐ Applicant claims SMALL ENTITY status.  
See 37 CFR 1.27.

II. PART B - FEE(S) TRANSMITTAL should be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). Even if the fee(s) have already been paid, Part B - Fee(s) Transmittal should be completed and returned. If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER:** Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

# Notice of Allowability

Application No.

09/816,852

Examiner

Jasmine J Clark

Applicant(s)

SEO ET AL.

Art Unit

2815

## -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to \_\_\_\_\_.
2. ☒ The allowed claim(s) is/are 1-16.
3. ☒ The drawings filed on 29 August 2001 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☒ All    b) ☐ Some\*    c) ☐ None    of the:
    1. ☒ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

### Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),  
Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit  
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),  
Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

**JASMINE CLARK**  
**PRIMARY EXAMINER**

## DETAILED ACTION

### *References Cited*

1. Glenn et al. (US 6,281,568 B1) in Fig. 11 shows a plurality of horizontal metal leads 73, each lead having a first side, and an opposite second side having at least one horizontal first surface and at least one horizontal second surface recessed from the first surface; a chip mounting substrate 72 having a first side and an opposite second side, the second side having a horizontal central surface and a horizontal peripheral surface fully around and recessed from the central surface; a semiconductor chip 52 including input/output pads 53 at a peripheral portion of the active surface, wherein each of the peripheral input/output pads 53 is electrically connected to the first side of a respective one of the leads; and a package body 81 covers the semiconductor chip 52, the recessed peripheral surface of the second side of the chip mounting substrate, and the at least recessed second surface of the second side of the leads, where the central surface of the second side of the chip mounting substrate and the at least one first surface of the second side of the leads are exposed at a horizontal first exterior surface of the package body. However, Glenn teaches fails to teach that the active surface of the chip 52 is facing but opposing the first side of the leads. Please also see Abe's Fig. 2, Minamio et al. (US 6,208,020 B1), and Takahara (JP 5-335474) in Fig.2).

The references of interest are cited: Wu (US 6,661,087 B2) in Fig. 1 (Filing Date )ct/09/2001) after the present Application. Similar to Wu is McCann et al. (US 6,597,059 B1) in Fig. 2 (Filing Date Apr/04/2001)

Art Unit: 2815

2. Claims 1-16 are allowed.

The following is an examiner's statement of reasons for allowance: please see paragraph 1 above.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Telephone Inquiry Contacts***

3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jasmine J Clark whose telephone number is (571) 272-1726. The examiner can normally be reached on Flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 09/816,852  
Art Unit: 2815

Page 4

Jjbc/06/12/04

**JASMINE CLARK**  
**PRIMARY EXAMINER**

A handwritten signature in cursive script, appearing to read "Jasmine Clark", written in black ink.

<b>Notice of References Cited</b>	Application/Control No. 09/816,852		Applicant(s)/Patent Under Reexamination SEO ET AL.	
	Examiner Jasmine J Clark		Art Unit 2815	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-6,597,059 B1	07-2003	McCann et al.	257/673
	B	US-2001/0013639 A1	08-2001	ABE, MASA AKI	257/666
	C	US-6,281,568 B1	08-2001	Glenn et al.	257/684
	D	US-6,661,087	12-2003	Wu, Chi-Chuan	257/692
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N	5-335474	12-1993	JP	Takahara	257/666
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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control number.		Substitute for form 1449A/PTO		C mpl te if Known	
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  (use as many sheets as necessary)				Application Number	09/816,852
				Filing Date	03/23/2001
				First Named Inventor	Seong Min Seo
				Art Unit	2815
				Examiner Name	Unknown
				Attorney Docket Number	AMKOR-024A
Sheet	1	of	1		

[illegible][illegible]

Examiner Signature	Jasmine Clark	Date Considered	6/3/04
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\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

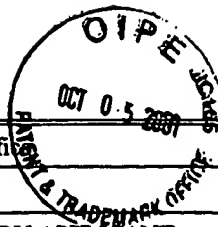
conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). <sup>2</sup> See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup> Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup> For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup> Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup> Applicant is to place a check mark here if English language Translation is attached.

English language Translation is attached.

**Burden Hour Statement:** This form is estimated to take 2.0 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO:** Assistant Commissioner for Patents, Washington, DC 20231.





U.S. Department of Commerce, Patent and Trademark Office	Atty Docket No.	Serial No.
	AB-1128 US	09/816,852
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Applicants	
(Use several sheets if necessary)	Seong Min Seo, Young Suk Chung, Jon Sik Paek, Jae Hun Ku, Jae Hak Yee	
	Filing Date	Group
	March 23, 2001	2815

## U.S. Patent Documents

*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
	AA						
	AB						
	AC						
	AD						
	AE						
	AF						
	AG						
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	AI						
	AJ						
	AK						

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## Foreign Patent Documents

							Translation	
		Document	Date	Country	Class	Subclass	Yes	No
nl	AL	94-1979	1/3/94	Korea	H01L	21/56		X
nl	AM	97-72358	11/7/97	Korea	H01L	23/50		X
	AN							
	AO							
	AP							

## OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)

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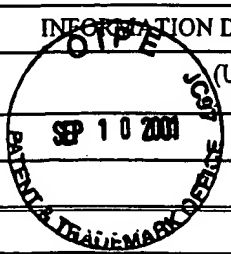
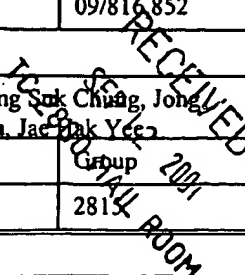
Examiner Jasmine Clark Date Considered 06/03/04

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U.S. Department of Commerce, Patent and Trademark Office					Atty Docket No.		Serial No.	
SEP 27 2001					AB-1128 US		09/816,852	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Seo, Young Suk Chung, Jon Sik Paek, Jae Hun Ku, Jae Hak Yee			
					Filing Date		Group	
					March 23, 2001		2815	
U.S. Patent Documents								
*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate	
gbe	AA	6,281,568 B1	8/28/01	Glenn, et al.	257	684		
gbe	AB	6,225,146 B1	5/1/01	Yamaguchi, et al.	438	123		
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	AI							
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Foreign Patent Documents								
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gbe	AL	1-106456 w/Eng. Abstract	4/24/89	Japan	H011	23/50		X
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	AN							
	AO							
	AP							
OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
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Examiner		Jasmine Clark		Date Considered		06/03/04		
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U.S. Department of Commerce, Patent and Trademark Office					Atty Docket No.		Serial No.	
					AB-1128 US		09/816 852	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Seo, Young Suk Chung, Jong Sik Paek, Jae Hun Ku, Jae Pak Yee			
					Filing Date		Group	
					March 23, 2001		2815	

U.S. Patent Documents							
*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate
Jae	AA	6,130,115	10/10/00	Okumura, et al.	438	124	
	AB	6,025,640	2/15/00	Yagi, et al.	257	666	
	AC	6,198,171	3/6/01	Huang, et al.	257	787	
	AD	6,242,281	6/5/01	McLellan, et al.	438	106	
	AE	5,736,432	4/7/98	Mackessy	438	123	
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Foreign Patent Documents							Translation	
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OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)		
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Examiner <u>Jasmine Clark</u>	Date Considered <u>06/03/04</u>
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U.S. Department of Commerce, Patent and Trademark Office					Atty Docket No.		Serial No.	
					AB-1128 US		09/816,852	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Seo, Young Suk Chung, Jong Sik Paek, Jae Hun Ku, Jae Hak Yee			
JUN 21 2001					Filing Date		Group	
					March 23, 2001		N/A	
U.S. Patent Documents								
*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate	
nee	AA	5,258,094	11/2/93	Furui, et al.	156	634		
	AB	5,278,446	1/11/94	Nagaraj, et al.	257	707		
	AC	5,435,057	7/25/95	Bindra, et al.	29	830		
	AD	5,783,861	7/21/98	Son	253	693		
	AE	5,835,988	11/10/98	Ishii	257	684		
	AF	5,859,471	1/12/99	Kuraishi, et al.	257	666		
	AG	5,866,939	2/2/99	Shin, et al.	257	666		
	AH	5,877,043	3/2/99	Alcoe, et al.	438	123		
	AI	5,977,630	11/2/99	Woodworth, et al.	257	712		
	AJ	4,707,724	11/17/87	Suzuki, et al.	357	71		
	AK	4,756,080	7/12/88	Throp, Jr., et al.	29	827		
nee	AL	5,273,938	12/28/93	Lin, et al.	437	207		
Foreign Patent Documents								
							Translation	
		Document	Date	Country	Class	Subclass	Yes	No
nee	AM	794 572 A2	9/10/97	EPO	H01L	23/495	X	
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	AO							
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OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
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Examiner		Tasmin Clark		Date Considered		06/03/04		
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U.S. Department of Commerce, Patent and Trademark Office					Atty Docket N .		Serial No.	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Se , Young Suk Chung, Jong Sik Paek, Jae Hun Ku, Jae Hak Yee			
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					March 23, 2001		N/A	
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nbe	AA	5,521,429	5/28/96	Aono, et al.	257	676		
	AB	5,981,314	11/9/99	Glenn, et al.	438	127		
	AC	6,143,981	11/7/00	Glenn	174	52.4		
	AD	5,336,931	8/9/94	Juskey, et al.	257	787		
	AE	5,977,613	11/2/99	Takata, et al.	257	666		
	AF	5,776,798	7/7/98	Quan, et al.	438	112		
	AG	3,833,984	10/1/74	Crane, et al.	29	193.5		
	AH	4,530,152	7/23/85	Roche, et al.	29	588		
	AI	5,041,902	8/20/91	McShane	357	79		
	AJ	5,172,213	12/15/92	Zimmerman	257	796		
nbe	AK	5,172,214	12/15/92	Casto	257	676		
Foreign Patent Documents								
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		Document	Date	Country	Class	Subclass	Yes	No
nbe	AL	9-92775	4/4/97	Japan	H01L	23/50	X	
	AM	55-163868 w/Eng. Abstract	12/20/80	Japan	H01L	23/48		X
	AN	60-195957 w/Eng. Abstract	10/4/85	Japan	H01L	23/48		X
	AO	DE 197 34 794	8/11/97	Germany	H01L	23/50		X
	AP	6-92076 w/Eng. Abstract	4/5/94	Japan	H01L	23/00		X
nbe	AQ	59-227143 w/Eng. Abstract	12/20/84	Japan	H01L	23/12		X
OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
	AR							
Examiner <u>Jasmine Clark</u>		Date Considered <u>06/03/04</u>						
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.								

U.S. Department of Commerce, Patent and Trademark Office					Atty Docket N .		Serial N .	
					AB-1128 US		09/816,852	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Seo, Young Suk Chung, Jong Sik Paek, Jae Hun Ku, Jae Hak Yee			
					Filing Date		Group	
					March 23, 2001		N/A	
U.S. Patent Documents								
*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate	
Jae	AA	5,604,376	2/18/97	Hamburgen, et al.	257	676		
	AB	5,608,267	3/4/97	Makulikar, et al.	257	796		
	AC	5,639,990	6/17/97	Nishihara, et al.	174	52.2		
	AD	5,640,047	6/17/97	Nakashima	257	738		
	AE	5,641,997	6/24/97	Ohta, et al.	257	788		
	AF	5,646,831	7/8/97	Manteghi	361	813		
	AG	5,650,663	7/22/97	Parthasarathi	257	706		
	AH	5,683,806	11/4/97	Sakumoto, et al.	428	343		
	AI	5,696,666	12/9/97	Miles, et al.	361	764		
	AJ	5,701,034	12/23/97	Marrs	257	706		
	AK	5,710,064	1/20/98	Song, et al.	437	220		
	AL	5,894,108	4/13/99	Mostafazadeh, et al.	174	52.4		
	AM	6,001,671	12/14/99	Fjelstad	438	112		
	AN	6,130,473	10/10/00	Mostafazadeh, et al.	257	666		
Foreign Patent Documents								
							Translation	
	AO	Document	Date	Country	Class	Subclass	Yes	No
Jae	AP	8-125066	5/17/96	Japan	H01L	23/12	X	
	AQ	8-306853	11/22/96	Japan	H01L	23/50	X	
	AR	9-8205	1/10/97	Japan	H01L	23/50	X	
	AS	9-8206	1/10/97	Japan	H01L	23/50	X	
	AT	9-8207	1/10/97	Japan	H01L	23/50	X	
OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
	AU							
Examiner <i>Jasmine Clark</i>				Date Considered <i>06/03/04</i>				
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with your communication to applicant.								

U.S. Department of Commerce, Patent and Trademark Office					Atty Docket No.		Serial No.	
					AB-1128 US		09/816,852	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT					Applicants			
(Use several sheets if necessary)					Seong Min Seo, Young Suk Chung, Jong Sik Paek, Jae Hun Ku, Jae Hak Yee			
					Filing Date		Group	
					March 23, 2001		N/A	
U.S. Patent Documents								
*Examiner Initial		Document Number	Date	Name	Class	Subclass	Filing Date If Appropriate	
nbe	AA	6,229,200	5/8/01	McLellan, et al.	257	666		
	AB	4,812,896	3/14/89	Rothgery, et al.	357	70		
	AC	5,157,480	10/20/92	McShane, et al.	357	74		
	AD	5,200,362	4/6/93	Lin, et al.	437	207		
	AE	5,200,809	4/6/93	Kwon	257	707		
	AF	5,214,845	6/1/93	King, et al.	29	841		
	AG	5,216,278	6/1/93	Lin, et al.	257	688		
	AH	5,221,642	6/22/93	Burns	437	207		
	AI	5,273,938	12/28/93	Lin, et al.	437	207		
	AJ	5,277,972	1/11/94	Sakumoto, et al.	428	355		
	AK	5,279,029	1/18/94	Burns	29	856		
	AL	5,332,864	7/26/94	Liang, et al.	174	52.4		
	AM	5,343,076	8/30/94	Katayama, et al.	257	717		
	AN	5,406,124	4/11/95	Morita, et al.	257	783		
	AO	5,424,576	6/13/95	Djennas, et al.	257	666		
	Foreign Patent Documents							
							Translation	
		Document	Date	Country	Class	Subclass	Yes	No
nbe	AP	57-45959 w/Eng. Abstract	3/16/82	Japan	H01L	23/28		X
	AQ	62-9639	1/17/87	Japan	H01L	21/56	X	
	AR	61-39555 w/Eng. Abstract	2/25/86	Japan	H01L	23/36		X
	AS	63-205935 w/Eng. Abstract	8/25/88	Japan	H01L	23/28		X
	AT	63-233555 w/Eng. Abstract	9/29/88	Japan	H01L	23/30		X
	AU	7-312405	11/28/95	Japan	H01L	23/50	X	
OTHER ART (Including Author, Title, Date, Pertinent Pages, Etc.)								
	AV							
Examiner <u>Jasmine Clark</u>		Date Considered <u>06/03/04</u>						
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H01L 23/50

識別記号

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(71)出願人 000000295

沖電気工業株式会社

東京都港区虎ノ門1丁目7番12号

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工業株式会社内

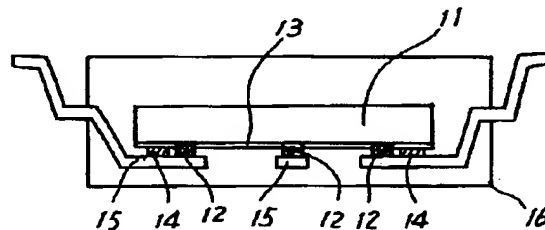
(74)代理人 弁理士 清水 守 (外2名)

(54)【発明の名称】 樹脂封止半導体装置

(57)【要約】

【目的】 パッケージ本体の幅方向寸法と厚さ方向寸法を小さくし、信号処理速度の向上とパッケージの小型化・薄型化を図る。

【構成】 樹脂封止半導体装置において、多数の突起電極12を有する半導体素子11と、その半導体素子11の周縁部に形成される絶縁基材14と、その絶縁基材14上に位置し、その絶縁基材14内部の突起電極12に直接接続される外部接続リードを設ける。



12: 突起電極

13: 保護膜



## 【特許請求の範囲】

【請求項1】(a)多数の突起電極を有する半導体素子と、

(b)該半導体素子の周縁部に形成される絶縁基材と、

(c)該絶縁基材上に位置し、該絶縁基材内部の前記突起電極に直接接続される外部接続リードを具備する樹脂封止半導体装置。

【請求項2】前記半導体素子の突起電極側と反対側にアイランドを固定してなる請求項1記載の樹脂封止半導体装置。

【請求項3】前記アイランドと共通電位を有する外部接続リードを重ね合わせたことを特徴とする請求項2記載の樹脂封止半導体装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は、半導体素子を樹脂封止する樹脂封止形の半導体装置に関するものである。

## 【0002】

【従来の技術】従来、このような分野の技術としては、例えば、実開昭55-423496号、特開平1-123428号、特開昭59-92556号、特開昭61-236130号公報に開示されるものがあつた。図3はかかる従来の半導体素子の樹脂封止形の装置の構成図である。

【0003】この図に示すように、1はアイランド2上に接合され、その縁部に多数の電極3を有する半導体素子、4はこの半導体素子1の周囲に設けられ、例えばAu等のワイヤ5によって前記電極3に接続される外部リード、6はこの外部リード4の一部、前記ワイヤ5、前記アイランド2及び半導体素子1を封止するパッケージ本体である。

【0004】このように構成された樹脂封止形の半導体素子においては、半導体素子1の取り付け時のずれを考慮すると、アイランド2のサイズを半導体素子1より大きい寸法に設定する必要がある、また、外部リード4の先端とアイランド2間の距離リード間をリードフレーム加工、ワイヤリング性を考慮する必要がある。

## 【0005】

【発明が解決しようとする課題】しかしながら、上記構成の半導体装置では、半導体素子が高集積化されるにしたがい、大型化、厚型化されると共にリードの本数が増大すると、多数のリードを半導体素子周辺に配置する場合に、該リード先端を一定の余裕を持って配列しなければならないため、半導体素子からリードまでの距離が長くなり、信号処理の遅延が生じることになる。また、パッケージ本体に収納可能な半導体素子サイズ余裕がなくなるため、パッケージ本体が大型化、厚型化する。

【0006】本発明は、以上述べた半導体装置の信号処理速度遅延とパッケージ本体の大型化、厚型化を解決するために、パッケージ本体の幅方向寸法と厚さ方向寸法

を小さくし、信号処理速度の向上とパッケージの小型化・薄型化を図ることができる樹脂封止半導体装置を提供することを目的とする。

## 【0007】

【課題を解決するための手段】本発明は、上記目的を達成するために、樹脂封止半導体装置において、多数の突起電極を有する半導体素子と、その半導体素子の周縁部に形成される絶縁基材と、その絶縁基材上に位置し、その絶縁基材内部の前記突起電極に直接接続される外部接続リードを設けるようにしたものである。

## 【0008】

【作用】本発明によれば、上記したように、突起電極が半導体素子のどの位置にでも設けられるため、外部接続リードとの接続に自由度が大きく、外部接続リードとの接続が突起電極とワイヤを用いずに直接接続できる。したがって、半導体装置の高機能、高集積化に伴い半導体素子が大きくなっても、パッケージ本体の幅方向の寸法も、厚さ方向の寸法も大きい寸法に設定する必要がなくなり、小型化・薄型化を図ることができる。

## 【0009】

【実施例】以下、本発明の実施例について図面を参照しながら詳細に説明する。図1は本発明の実施例を示す樹脂封止半導体装置の平面図、図2は図1のA-A線断面図である。これらの図において、11は半導体素子であり、表面に厚さ1 $\mu$ m～3 $\mu$ mの厚さを有するポリイミド系あるいはプラズマ窒化膜等の保護膜13と、半田、Au等の突起電極12を有している。14はポリイミド系あるいはエポキシ系等の絶縁基材であり、半導体素子11上面にある外部接続リード15の突起電極12と接続される領域以外のインナーリード下面に位置し、インナーリードの振動防止と、インナーリードと半導体素子11が接続される時のメカニカル応力保護を兼ねている。外部接続リード15のインナーリードと突起電極12は、リフローあるいは熱圧着で接続し、その後、樹脂封止成形により完成する。なお、16はパッケージ本体である。

【0010】この実施例においては、アイランドが省略されている。次に、図4は本発明の他の実施例を示す樹脂封止半導体装置の平面図、図5は図4のB-B線断面図である。なお、上記実施例と同様の部分については、同じ番号を付し、その説明は省略する。これらの図に示すように、この実施例においては、アイランド17が付加され、半導体素子11の突起電極12と外部接続リード15を接続する前にアイランド17に半導体素子11をAu、Ag、絶縁ペースト等のダイスボンディングし、アイランド17と共通電位(接地電位を含む)を有する外部接続リード15aとを、その外部接続リード15aの部分15bにおいて、重ね合わせて配置し、その後、樹脂封止成形を行い完成する。なお、18はアイランド17のサポートである。

【0011】なお、本発明は上記実施例に限定されるものではなく、本発明の趣旨に基づいて種々の変形が可能であり、これらを本発明の範囲から排除するものではない。

#### 【0012】

【発明の効果】以上、詳細に説明したように、本発明によれば、次のような効果を奏することができる。

(1) 突起電極が半導体素子のどの位置にでも設けられるため、外部接続リードとの接続に自由度が大きく、外部接続リードとの接続が突起電極とワイヤを用いずに直接接続できるため、半導体装置の高機能、高集積化に伴い半導体素子が大きくなっても、パッケージ本体の幅方向の寸法も、厚さ方向の寸法も大きい寸法に設定する必要がなくなり、小型化・薄型化を図ることができる。

【0013】(2) このように、パッケージ本体の幅方向の寸法も、厚さ方向の寸法も大きい寸法に設定する必要がなくなり、小型化・薄型化により、同時に信号処理速度の向上を図ることができる。

(3) 半導体素子上で突起電極と接続される領域外のインナーリードに絶縁基材を貼り付けたことにより、インナーリードの振動を防止することができるようになり、接続部の接合安定性と信頼性が得られる。

【0014】(4) 同時にインナーリード接続時のメカニカル応力ダメージを絶縁基材が吸収することにより、半導体素子の損傷を防止することができる。

(5) 半導体素子の回路で電源、GHDパターンの突起電極を半導体素子上に複数設け、外部接続リードを半導体素子の中央に通る1本と接続することによって、電源、GHDパターンの長さが短くなり、その上容易になる。したがって、電源、GHD抵抗増によるノイズ余裕が増し、同時に半導体素子を小さくでき、高集積化を図ることができる。

【0015】(6) 大電流が必要なパワー半導体素子においても複数のGHDを設けることにより、電流の分流が容易になり、動作時に発生する熱量を低下させることができ、直接リードを伝わって熱を逃すことができるので、極めて熱抵抗の小さい、放熱性に優れた樹脂封止半導体装置を得ることができる。

(7) アイランド付きのリードフレームにおいては、半導体素子をダイスボンド材によってボンディングし、アイランドと外部接続リードフレームとを重ね合わせるように配置して、半導体素子の突起電極と接続し封止樹脂で成形する場合、封止樹脂成形時の樹脂圧力に対して上下のパッケージ強度が増し、パッケージ本体中の半導体素子の位置が安定した最適化構造が得られる。

#### 【図面の簡単な説明】

【図1】本発明の実施例を示す樹脂封止半導体装置の平面図である。

【図2】図1のA-A線断面図である。

【図3】従来の半導体素子の樹脂封止形の装置の構成図である。

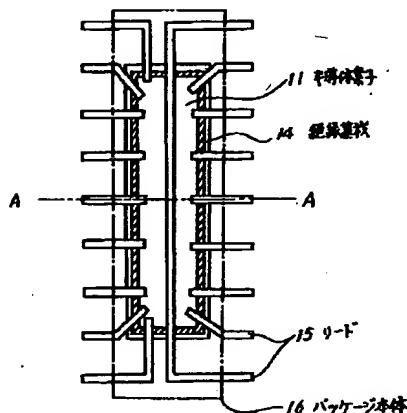
【図4】本発明の他の実施例を示す樹脂封止半導体装置の平面図である。

【図5】図4のB-B線断面図である。

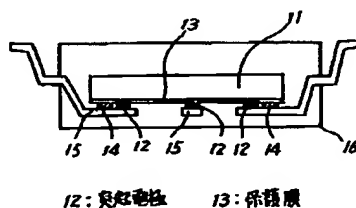
#### 【符号の説明】

- 11 半導体素子
- 12 突起電極
- 13 保護膜
- 14 絶縁基材
- 15 外部接続リード
- 15a 共通電位を有する外部接続リード
- 17 アイランド
- 18 アイランドのサポート
- 19 ダイスボンド材

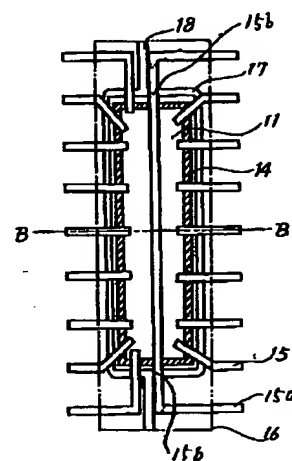
【図1】



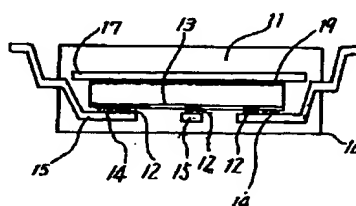
【図2】



【図4】



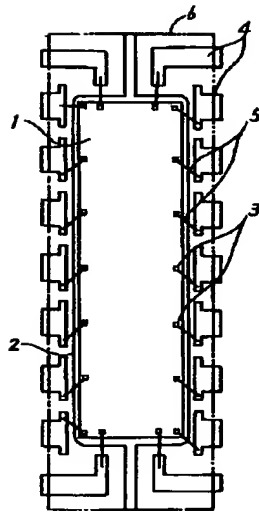
【図5】



(4)

特開平5-335474

【図3】



PAT-NO: JP405335474A  
DOCUMENT-IDENTIFIER: JP 05335474 A  
TITLE: RESIN SEALED SEMICONDUCTOR DEVICE  
PUBN-DATE: December 17, 1993

INVENTOR-INFORMATION:  
NAME  
TAKAHARA, MASARU

ASSIGNEE-INFORMATION:  
NAME COUNTRY  
OKI ELECTRIC IND CO LTD N/A

APPL-NO: JP04141876  
APPL-DATE: June 3, 1992  
INT-CL (IPC): H01L023/50  
US-CL-CURRENT: 257/666, 257/696

ABSTRACT:

PURPOSE: To shorten the dimensions in the width and thickness directions of a package main body for attaining the acceleration of signal processing rate as well as the miniaturization and thinning of the package.

CONSTITUTION: Within the title resin sealed semiconductor device, a semiconductor element 11 having multiple protruded electrodes 12, multiple insulating base materials 14 formed on the peripheral part of the semiconductor element 11 as well as outer lead connecting leads 15 positioned on the insulating base materials 14 and directly connected to the

bump electrodes 12  
inside the insulating base materials 14 are provided in the  
device.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/816,852	03/23/2001	Seong Min Seo	AB-1128 US	6922

TITLE OF INVENTION: SEMICONDUCTOR PACKAGE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1330	\$300	\$1630	09/16/2004

EXAMINER	ART UNIT	CLASS-SUBCLASS
CLARK, JASMINE JHIHAN B	2815	257-666000

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☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

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09/816,852	03/23/2001	Seong Min Seo	AB-1128 US	6922
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SKJERVEN MORRILL LLP 25 METRO DRIVE SUITE 700 SAN JOSE, CA 95110			CLARK, JASMINE JHIHAN B	
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## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 656 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 656 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) system (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (703) 305-1383. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (703) 305-8283.